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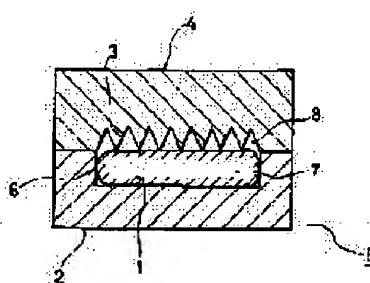
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(54) OPTICAL REFLECTION MIRROR AND PRODUCTION THEREOF

(57)Abstract:

PURPOSE: To efficiently produce an optical reflection mirror having desired flatness with high accuracy at a low cost from a plastic material.

CONSTITUTION: The die used for the production has such a structure that the rear surface which is opposite to the mirror surface 1 is formed as a rough surface 3 to cause sink. The optical reflection mirror is produced by the following method. The cavity 6 of the molding die is filled with a plastic material but the supply of the material 7 is stopped before the cavity is completely filled. The plastic material 7 is tightly adhered to the mirror forming surface 1. Since the surface opposite to the mirror forming surface 1 is formed to have low wettability, the adhesion strength of the plastic material 7 to this surface is made small. In this state, the plastic material 7 is cooled and solidified so that the surface having small adhesion strength causes sink. Then the plastic material is released from the die.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention -- the object for molding -- metal mold -- it is related with the manufacturing method of the reflective mirror for photologies which fabricates the reflective mirror for photologies which is filled up with plastic material inside and fabricated, and its reflective mirror for photologies

[0002]

[Description of the Prior Art] the technique of obtaining an accurate optical surface while the technique of making plastic material a molding material and fabricating an optic generally spreads ***** -- the object for molding -- metal mold -- inside -- the hyperbaric pressure -- plastic material -- being filled up -- the pressure -- the object for molding -- the technique of fabricating by reversing the configuration of a molding side in all the internal-surface-of-parietal-bone fields of metal mold is adopted widely [0003] moreover, the aforementioned object for molding -- the molding side of metal mold -- the purposes other than the enhancement in molding precision, for example, metal mold, -- the metal mold corresponding to [like / the form block of the technique or the JP,62-102608,U publication which performs surface treatment from the purposes, such as an intensity of the very thing, and thermal resistance] the sliding surface of the oil seal for a manufacture -- the form block for oil seal which attached and constituted the minute salient by the metallizing on the front face is developed

[0004]

[Problem(s) to be Solved by the Invention] By however, restoration of the plastic material by the hyperbaric pressure in the molding technique of the aforementioned conventional reflective mirror for photologies the object for molding -- all the fields of the molding side of metal mold being reversed, and in the forming technique which is going to obtain an accurate flat surface in respect of all That the flat surface with a precision good within a mold may be made to invert, when this was made to release from mold, there was a case where the asymmetry which is hard to apply was produced in the flat surface which deformation occurs for the internal stress produced by being influenced of high-pressure at the time of the aforementioned molding, and is required of the reflective mirror for photologies. The yield on molding of such a fault was bad, and it had become causes, like the manufacturing cost of the reflective mirror for photologies becomes high.

[0005] Moreover, the aforementioned fault becomes still remarkable as a result of leading to asymmetry of the molding side by the cenogenesis at the time of mold release in order that the aforementioned minute salient may increase ***** to the mold of mold goods, when it is going to obtain an enhancement operation of the parity of the molding side by hyperbaric-pressure restoration of the aforementioned plastics, in having a minute salient in a molding side like a form block given in JP,62-102608,U.

[0006] Therefore, this invention was developed in view of the fault in the aforementioned conventional forming technique, and aims at offer of the manufacturing method of the reflective mirror for photologies which can manufacture with high precision and efficiently cheap moreover the reflective mirror for photologies which has desired smoothness, and this reflective mirror for photologies.

[0007]

[Means for Solving the Problem] Invention concerning a claim 1 is a reflective mirror for photologies which has the tooth back which considered as the split face and formed *****, and the field which is connected with the aforementioned mirror side and surrounds this mirror side while it carries out field opposite with the mirror side which is a flat surface and consists of a mirror plane in the reflective mirror for photologies formed in plastic material, and the aforementioned mirror side.

[0008] according to a claim 1 -- the aforementioned tooth back -- a split face -- and the object for the molding for fabricating the field which the smoothness and mirror-plane nature of a mirror side which carry out field opposite are secured certainly, and surrounds this tooth back and the aforementioned mirror side, since **** is formed -- since it is not necessary to carry out mirror-plane finishing (mirror finish finishing) of the molding side of metal mold, it becomes the highly precise and cheap reflective mirror for photologies

[0009] In the manufacturing method of the reflective mirror for photologies which injects plastic material inside and fabricates the reflective mirror for photologies to it moreover, invention concerning a claim 2 -- the object for molding -- metal mold -- Just before restoration of plastic material is completed inside, restoration of the aforementioned material is suspended. the object for the aforementioned molding -- metal mold -- The aforementioned plastic material is stuck to the molding side which consists of a mirror plane for inner mirror side molding. the aforementioned object for molding -- metal mold -- And the adhesion intensity of

the field and the aforementioned plastic material which counter the molding side for mirror side molding the status that it was made lower than the adhesion intensity to the molding side for the aforementioned mirror side molding -- carrying out -- the status -- the aforementioned object for molding -- metal mold -- carry out cooling solidification of the plastic material injected inside, the low molding side of an adhesion intensity is made to produce *****, and the reflective mirror for photologies is manufactured [0010] Counter metal mold 2 and the mirror molding side 1 the mirror-plane side which has the aforementioned mirror molding side 1 which consists of a mirror plane for drawing 1 explaining such technique more concretely. In metal mold 5 the object for molding constituted by metal mold 4 the split-face side which has the molding side 3 which consists of the split face to which **** nature falls as compared with the aforementioned mirror plane -- the status (the status with [, compared with the mirror-plane 1 side] some opening 8 in the pars basilaris ossis occipitalis of the irregularity by the side of a split face 3 --) that it was seemingly filled with the plastic material 7 with which it filled up in the mold cavity 6 in the mold cavity 6 However, cooling starts within a mold cavity 6, without applying a dwelling, while it becomes indicating extremely that the opening 8 by the side of a split face 3 is easy to understand on an explanation in illustration, and deflation begins.

[0011] While the resin by the side of the mirror plane 1 which compares with a split-face 3 side and surpasses a thermolysis operation at this time is cooled early, as a result of carrying out a solid by the mirror-plane 1 side of a resin and pulling the remaining resin at a mirror-plane 1 side, **** arises in a split-face 3 side. Therefore, while high imprint nature is demonstrated with the adhesion of the plastic material 7 to the aforementioned mirror-plane 1 side, when deflation of plastic material 7 arises on the basis of a mirror-plane 1 side, the molding side of a mirror plane 1 is imprinted with high precision by mold goods.

[0012] the object for molding with which carries out a deer and operation of this invention is presented -- metal mold In metal mold the object for molding -- metal mold -- the object for molding which is filled up with plastic material inside and fabricates the reflective mirror for photologies -- the aforementioned object for molding -- whether minute irregularity is prepared in the molding side which counters with the mirror molding side of the aforementioned reflective mirror for photologies of metal mold Change to this and the low surface treatment layer or sheet-like member of **** nature is made to intervene as compared with the **** nature of the aforementioned mirror molding side. By constituting by preparing the porous material material layer as a means by which **** nature may furthermore be fallen as compared with the **** nature of the aforementioned mirror molding side, the operation in the aforementioned this invention technique of getting poisoned by manufacture of the reflective mirror for photologies can be obtained accurately.

[0013]

[Embodiments of the Invention] The gestalt of operation of this invention is explained with a drawing below.

(Gestalt 1 of operation) view 2 or the drawing 4 -- the gestalt 1 of operation of this invention -- being shown -- drawing 2 -- the object for molding -- cross section and drawing 3 a and drawing 3 b of metal mold are explanatory drawing in which plan and side elevation, and drawing 4 a, drawing 4 b, and drawing 4 c of mold goods show the molding status of mold goods

[0014] now, the object for injection molding of drawing 2 illustration -- the fixed side which consists of the fixed bottom place 13 which attached the stationary retainer plate 12 which metal mold 10 equips with the fixed side nesting 11, and this -- metal mold -- the movable side which consists of a movable bottom plate 19 which attached the aforementioned movable retainer plate 16 through the movable side supporting plate 17 and the spacer block 18 which support the movable retainer plate 16 which counters the section 14 and the aforementioned fixed side nesting 11, and equips the movable side nesting 15, and this -- metal mold -- it is constituted by the section 20

[0015] Moreover, molding side 11a of the aforementioned fixed side nesting 11 consists of a grain side, and the flatness and mirror-plane finishing (mirror finish finishing) which are required of the mirror side of the reflective mirror for photologies whose molding side 15a of the aforementioned movable side nesting 15 countered and arranged in this fixed side nesting 11 is mold goods are given. Furthermore, the mold cavity 25 is formed of the knock out pins 23 and 24 supported by the molding sides 11a and 15a, the aforementioned movable retainer plate 16, and the vertical knock out plates 21 and 22 of the aforementioned fixed side nesting 11 and the movable side nesting 15.

[0016] In addition, mirror-plane finishing is not given for the end faces 23a and 24a of molding side 16a of the movable retainer plate 16 in the aforementioned mold cavity 25 which stands in a row between molding side 11a and molding side 15a, and the knock out pins 23 and 24. And it is constituted by making the end face of the knock out pin 31 which the sprue 26 of this sprue bush 27 was made open for free passage, and arranged sprue ***** 28, the runner 29, and the gate 30 in the movable retainer plate 16 while the sprue bush 27 which has a sprue 26 was fixed to the aforementioned stationary retainer plate 12, and was supported to the aforementioned vertical knock out plates 21 and 22 except aforementioned sprue ***** 28.

[0017] the object for injection molding which consists of the above configuration -- in fabricating the reflective mirror for photologies as mold goods shown in drawing 3 with metal mold 10, it fills up with plastic material in a mold cavity 25 from the cylinder nozzle of the making machine not to illustrate through the sprue 26, sprue ***** 28, the runner 29, and the gate 30 of the sprue bush 27 At this time, just before restoration of the plastic material into a mold cavity 25 is completed, the restoration from the aforementioned cylinder nozzle is suspended, and molding is executed, without putting the pressure into a mold cavity 25 henceforth.

[0018] Therefore, cooling solidification of the plastic material with which it filled up in the mold cavity 25 is carried out, and the mold goods 32 shown in drawing 3 are fabricated. then, a movable side -- metal mold 20 -- a parting surface 33 -- minded -- a fixed side -- while a mold aperture is carried out from metal mold 14, the aforementioned mold goods 32 are projected out of a mold by the knock out pins 23, 24, and 31 which operate by the vertical knock out plates 21 and 22 pressed with the vegetation rod (not shown) of a making machine, and it is released from mold

[0019] That is, drawing 3 shows the mold goods 32 after mold release, and the mold goods 32 of this illustration consist of the mold-goods gate section 35 connected with the product section 34 and this, the mold-goods runner section 36, and the mold-goods sprue section 37. now, the object for injection molding of the aforementioned configuration -- according to the molding technique of the above-mentioned mold goods 32 using metal mold 10 Restoration of [in the mold cavity 25 of the plastic material of the cylinder nozzle of a making machine] is suspended just before the completion. As a result of fabricating, without putting a future pressure, the molding side corresponding to mirror-plane 15a of the movable side nesting 15 It compares with this. Molding side 16a of the others of grain side 11a of the bad fixed side nesting 11 of **** nature, and mirror-plane 15a and grain side 11a which do and stand in a row on the outside of mirror-plane 15a, and end-face 23a of knock out pins 23 and 24, While cooling early from 24a, in connection with cooling by the side of this mirror-plane 15a, **** occurs by starting deflation of the plastic material in a mold cavity 25 in the aforementioned grain side 11a and molding side 16a of the outside of mirror-plane 15a, and the end faces 23a and 24a.

[0020] On the other hand, mirror-plane 15a is imprinted with high precision without occurrence of **** by the correspondence side with the aforementioned mirror-plane 15a. While **** 39a occurs by drawing 4 a and drawing 4 b in the correspondence side 38 with grain side 11a of the fixed side nesting 11 among the product sections [in mold goods 32 in such molding status being shown] 34 Molding side 16a which stands in a row on the outside of the aforementioned mirror-plane 15a of a movable retainer plate 16, and surrounds this, And **** is not generated in the correspondence side 41 with mirror-plane 15a of ** and the movable side nesting 15 which **** 39b generates in the correspondence side 40 with the end faces 23a and 24a of knock out pins 23 and 24, i.e., the mirror side of the reflective mirror for photologies, at all.

[0021] However, although according to the molding which does not apply a dwelling [in a mold cavity 25] the mirror side 41 used as the correspondence side with mirror-plane 15a is not made to generate **** but the highly precise imprint nature of mirror-plane 15a is demonstrated on the above-mentioned molding technique as mentioned above as shown in the following table 1 Conversely, when a dwelling was applied and fabricated, as there was no occurrence of **** 39a of a fixed side and **** 39b of a movable side and it was shown in drawing 4 c, it became clear that **** 39c occurs in the correspondence side 41 with mirror-plane 15a.

[0022]

[Table 1]

保压の有無	ヒケの有無	
	鏡面	粗面
無	無	有
有	有	無

[0023] (Gestalt 2 of operation) that view 5 or the drawing 11 indicates the gestalt 2 of operation of this invention to be -- it is -- drawing 5 -- the object for molding -- the cross section, the drawing 6 , and the drawing 7 of metal mold -- the enlarged view of this important section, the drawing 8 , or drawing 10 The partial enlarged view of the molding side of fixed side nesting and the drawing 11 are partial expanded sectional views of movable side nesting. now, the object for molding in the gestalt of this operation -- metal mold 10 -- the same component as the gestalt 1 of operation -- the same number -- giving -- the explanation -- omitting -- the object for injection molding of the gestalt 1 of operation -- an explanation is added to below only about components other than the configuration applicable to metal mold

[0024] Therefore, while it is attached through the fixed side sleeve 42 and the movable side sleeve 43 to the stationary retainer plate 12 and the movable retainer plate 16, as it is shown in the drawing 7 in which molding side 11a of the fixed side nesting 11 expands and shows the irregularity of the drawing 6 and the drawing 6 , the fixed side nesting 11 and the movable side nesting 15 It is formed by forming the minute irregularity 44, and mirror finish finishing with very high smoothness is given so that molding side 15a of the movable side nesting 15 can imprint the mirror plane required of the mirror side of the reflective mirror for photologies as mold goods.

[0025] In addition, 45 in drawing shows a core pin and 46 shows a runner knock out pin, respectively. now, the object for molding which consists of the above configuration -- as well as the gestalt 1 of the aforementioned implementation when fabricating the mold goods as a reflective mirror for photologies with metal mold 10, while it is filled up with plastic material in a mold cavity 25 through a sprue 26, the runner 29, and the gate 30 and restoration is suspended from the cylinder nozzle of a making machine just before the completion, a pressure is made not to take in a mold cavity 25 henceforth

[0026] A deer is carried out, while the inside of a mold cavity 25 becomes full [the plastic material filled up with this status in the mold cavity 25] seemingly (status with [compared with the mirror-plane 15a side] some opening in pars-basilaris-ossis-occipitalis 44a of the irregularity 44 by the side of split-face 11a), cooling starts within a mold cavity 25 that a dwelling does not have such a thing, and deflation starts with it. The close side with molding side 11a begins sublation, and **** occurs at the same time plastic material does not stick to the whole surface with ***** at molding side 11a of the fixed side nesting 11 but deflation starts, in order not to apply a dwelling at this time.

[0027] For this reason, deflation will be produced on the basis of molding side 15a of the movable side nesting 15, and mirror-plane 15a which consists of the high precision flat surface of the movable side nesting 15 is imprinted by mold goods as it is. After an appropriate time, they are the core pin 46 which opens a mold from a parting line 33 after the aforementioned

completion of molding in a mold cavity 25, and is supported by the knock out plate not to illustrate, the runner knock-out pin 47, and the thing which carries out a sprue ejector, releases mold goods from mold through a pin 31, and takes out mold goods.

[0028] And as described above, the mold goods with the highly precise flat surface for reflective mirrors for photologies can be obtained. It changes to the minute irregularity 44 of the drawing 7 illustration in molding side 11a of the aforementioned fixed side nesting 11. moreover, as shown in drawing 9 By spraying the shot ball 48 on molding side 11a by air ** or the fluid pressure (carrying out a blast), and forming the smooth irregularity 49 As compared with the aforementioned irregularity 44, further, it eats, **** becomes weaker and it has the advantage which can make the sublation at the time of the aforementioned deflation the status over molding side 11a of plastic material are easier to exfoliate.

[0029] Furthermore, as shown in drawing 10, the same operation effect as the aforementioned irregularity 49 can be acquired by giving the micrometers [some dozens of] coat layers 50, such as nickel plating which is not electrolyzed [electrolysis or], to the front face of the minute irregularity 44 of drawing 7 illustration of molding side 11a of the aforementioned fixed side nesting 11. In addition, as shown in drawing 11 and it described above to molding side 15a of this movable side nesting 15 while the aforementioned movable side nesting 15 was formed by the good aluminum material and copper material of thermal conductivity, mirror finish finishing is given. And by forming the thin film layers 51, such as TiN and CrN, in this mirror ***** side 15a By the operation with the aforementioned sufficient thermal conductivity, can take early the heat of the skin which forms a mirror side, it can carry out mold inversion, and are contrary to this. When the temperature of the split face by the minute irregularity 44 of the fixed side nesting 11 of an opposite side is higher than mirror-plane 15a, the **** phenomenon by deflation theoretically Since it comes out to the one where temperature is surely higher, in the relation with molding side 11a of the fixed side nesting 11 of drawing 7 , the drawing 9 , and the drawing 10 , molding of the status that the operation effect mentioned above was promoted more is realized, and molding of the high reflective mirror of optical profile irregularity is attained.

[0030] And by the thin film layer 51 of aforementioned view 11 , while the corrosion resistance of molding side 15a of the movable side nesting 15 improves, it is useful to prevention of surface crack occurrence etc., and prolongation-of-life-ization of the life of the movable side nesting 15 can be measured. Furthermore, depend molding side 11a of the drawing 7 mentioned above or the fixed side nesting 11 of drawing 10 illustration on the minute irregularity 44, 49, and 50. It adds to the configuration which measured the fall of the **** nature to the mirror plane of molding side 15a of the movable side nesting 15. When forming molding side 11a of the fixed side nesting 11 by the oil-impregnation metal layer, the gestalt of the implementation currently further used for the gas range of marketing to molding side 11a etc., such as a configuration which carries out self-cleaning processing and was made to lessen the touch area with plastic material as much as possible, can be mentioned.

[0031] (Gestalt 3 of operation) view 12 and the drawing 13 -- the gestalt 3 of operation of this invention -- being shown -- drawing 12 -- the object for molding -- the expanded sectional view of the important section of metal mold and the drawing 13 are expanded sectional views showing the receptacle section of a sheet-like member the object for molding of the gestalt of this operation -- metal mold 10 -- the object for molding of the gestalt 2 of operation -- the purpose to which the **** nature of molding side 11a of the fixed side nesting 11 to the **** nature of molding side 15a of the movable side nesting 15 in the configuration of metal mold 10 is made to fall -- with It is what was constituted by covering molding side 11a of the fixed side nesting 11, making the sheet-like member 52 which changes from a Teflon sheet etc. to the support concavity 53 (refer to the drawing 13) prepared in the movable side sleeve 43 support. Other configurations consist of the same configuration as the gestalt 2 of operation, attach the same number about the same component, and omit the explanation.

[0032] therefore, the object for molding which consists of such a configuration -- by fabricating by the molding technique of the gestalt 2 operation, and the same technique also with metal mold 10 The plastic material with which it filled up in the mold cavity 25 by the sheet-like member 52 by which it is placed between molding side 11a of the fixed side nesting 11 The result by which the same operation as molding side 11a of the fixed side nesting 11 of the gestalt 2 of the aforementioned implementation is demonstrated, Deflation is started in connection with cooling of the plastic material with which it filled up in the mold cavity 25, it will be generated on the basis of molding side 15a of the movable side nesting 15, and the deflation can fabricate the reflective mirror for photologies by which the mirror plane of molding side 15a was imprinted with high precision.

[0033] In addition, although the sheet-like member 52 is exfoliated from mold goods, even if the case where the sheet-like member 52 unites with mold goods, and cannot exfoliate arises, it cannot become a problem, but mold goods can be used, without becoming poor.

[0034] (Gestalt 4 of operation) View 14 is the cross section of an important section showing the gestalt 4 of operation of this invention. the object for molding of the gestalt of this operation -- what was constituted by fixing the ventilation opening 55 behind this fixed side nesting 11, and forming the air generator 54 in it while metal mold 10 forms the fixed side nesting 11 by porous material material, for example, ceramic material etc., -- it is -- other configurations -- the object for molding of the gestalt 2 of operation -- it consists of the same configuration as metal mold 10, the same number is given to the same component, and the explanation is omitted

[0035] now, the object for molding which consists of such a configuration -- the plastic material with which it fills up in a mold cavity 25 with metal mold 10, when fabricating by the molding technique of the gestalt 2 operation, and the same technique The result to which an air space intervenes between molding side 11a and the aforementioned plastic material when the air from the aforementioned air generator 54 is blown into the molding side 11a side of the fixed side nesting 11 into the fixed side nesting 11 through the ventilation opening 55, The contact to molding side 11a of the fixed side nesting 11 of plastic material is prevented.

[0036] Therefore, it will be generated like the gestalt of each aforementioned implementation on the basis of molding side 15a of the movable side nesting 15, and the mirror plane in molding side 15a of the movable side nesting 15 is imprinted with high

precision by mold goods, and the deflation produced in connection with cooling of the plastic material in a mold cavity 25 can fabricate the desired reflective mirror for photologies. in addition, the gestalt of each operation mentioned above -- setting -- a movable side -- metal mold, although the example which forms in the molding side of the section the molding side of the mirror side required of the reflective mirror for photologies has been described this -- reverse -- a fixed side -- metal mold -- the configuration prepared in the section -- operation -- possible -- for example, the object for molding -- it can carry out on the arrangement configuration of metal mold, choosing one of configurations according to the arrangement statuses, such as a gate position, etc.

[0037]

[Effect of the Invention] According to this invention, the reflective mirror for photologies can be manufactured with high precision and efficiently, and cheaply. Moreover, the obtained reflective mirror for photologies can acquire the mirror side which certainly has desired smoothness and desired mirror-plane nature.

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] The reflective mirror for photologies characterized by having the tooth back which considered as the split face and formed **** while field opposite was carried out with the mirror side which is a flat surface and consists of a mirror plane in the reflective mirror for photologies formed in plastic material, and the aforementioned mirror side, and the field which is connected with the aforementioned mirror side and surrounds this mirror side.

[Claim 2] In the manufacturing method of the reflective mirror for photologies which injects plastic material inside and fabricates the reflective mirror for photologies to it the object for molding -- metal mold -- Just before restoration of plastic material is completed inside, restoration of the aforementioned material is suspended. the aforementioned object for molding -- metal mold -- The aforementioned plastic material is stuck to the molding side which consists of a mirror plane for inner mirror side molding. the aforementioned object for molding -- metal mold -- And the adhesion intensity of the field and the aforementioned plastic material which counter the molding side for mirror side molding the status that it was made lower than the adhesion intensity to the molding side for the aforementioned mirror side molding -- carrying out -- the status -- the aforementioned object for molding -- metal mold -- the manufacturing method of the reflective mirror for photologies which carries out cooling solidification of the plastic material injected inside, and is characterized by making the low molding side of an adhesion intensity produce ****, and manufacturing the reflective mirror for photologies

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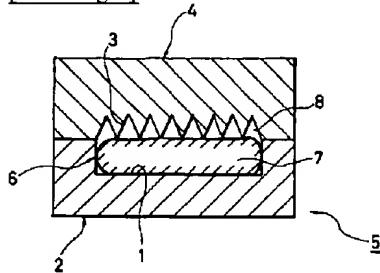
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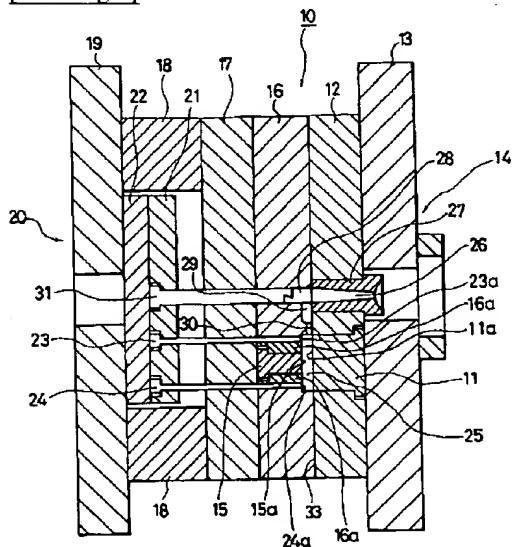
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DRAWINGS

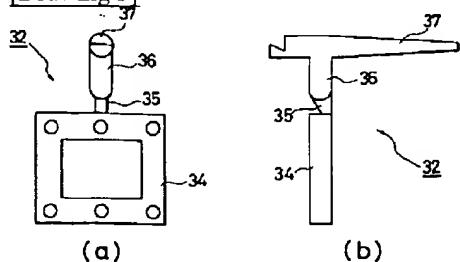
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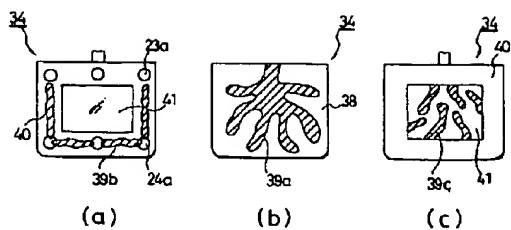
[Drawing 2]



[Drawing 3]



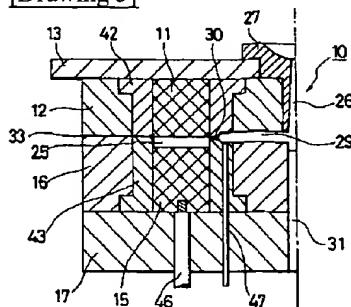
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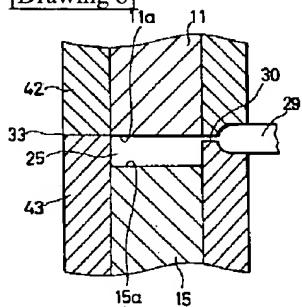
[Drawing 8]



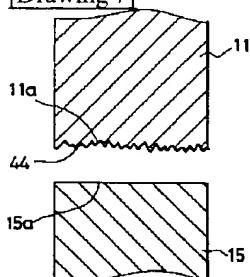
[Drawing 5]



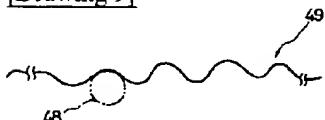
[Drawing 6]



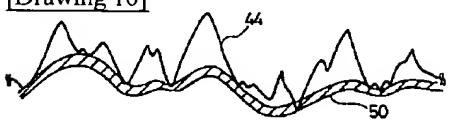
[Drawing 7]



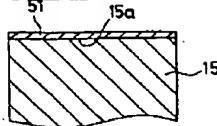
[Drawing 9]



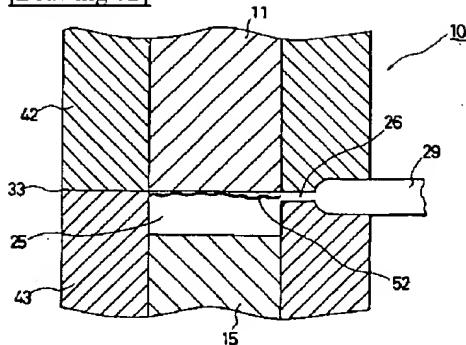
[Drawing 10]



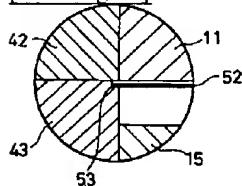
[Drawing 11]



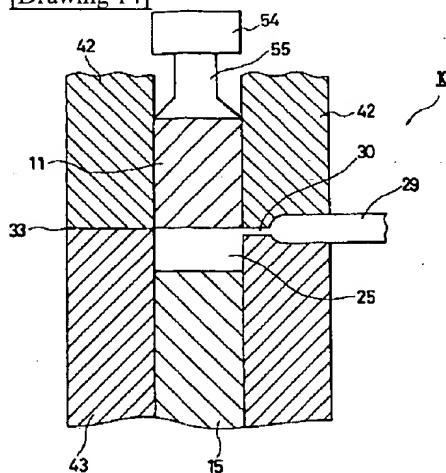
[Drawing 12]



[Drawing 13]



[Drawing 14]



[Translation done.]